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Conservation Status of Lontar Palm Trees (*Borassus flabellifer* Linn) In Jeneponto District, South Sulawesi, Indonesia

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Abstract

This study aimed to describe the botanical description, conservation status and potentials of Sulawesi native lontar palm trees (*Barassus flabellifer* Linn*)* in Jeneponto district, South Sulawesi, Indonesia. This study was extended to include a study on the community's attitude towards preservation of lontar palm trees involving 30 people distributed over three research sites. Overall 53% of the dry-land in Jeneponto district is grown by lontar palm trees with the tree density ranging from 50 trees per ha for trees aged between 1-5 years; 37 trees per ha for trees aged between 5-10 years; and 32 trees per ha for trees aged more than 10 years. New lontar palm trees which are being managed by the local communities are planted on 27% of the land area. Tamalatea sub-district has the largest lontar palm tree population in Jeneponto District.

Keyword**:** palmyra, botany, Jeneponto, Celebes island

Introduction

In reference to the lontar or palmyra palm trees (*Barassus flabellifer* Linn*)* in South Sulawesi, Indonesia, there are mixed views on their origin. Most botanists believe that it originated in Africa and was then introduced into India a long time ago (Fox, 1997). Another view is that it is native to South Asia, Southeast Asia, New Guinea and Tropical Africa (Morton, 1988). Lontar palm trees are extensively cultivated in South Asia and Southeast Asia. It is cultivated or found in semi-wild stands in India, Sri Lanka, Burma, Thailand, Cambodia, China, West Malaysia, Indonesia, and New Guinea (Morton, 1988). In India, it is planted to provide windbreaks on the plains. It can also be found growing in Hawaii and Southern Florida.

Jeneponto is one of the many districts in the province of South Sulawesi where the lontar palm trees have become a symbol of the area. Lontar palm trees can be found in almost all parts of Jeneponto district, but particularly in the sub-districts of Bangkala, Tamalatea and Binamu. However, plantings and growth pattern of the trees can be irregular throughout the region. It takes between 10 and 20 years for the lontar palm trees to reach maturity.

Records of BPS (Central Statistics Agency) Jeneponto 2009-2012 reported that in recent times the area under lontar plam trees in Jeneponto district has been reduced by more than 16%, from 422 ha to 363 ha. This reduction reflects the impact of several external factors, including the impact of population growth resulting in increased demand for building materials for home construction. Between 2003 and 2013, the population of Jeneponto district has shown remarkable growth, reaching 323,023 in 2013 (BPS Jeneponto, 2014). The increased population growth has increased the need for housing, which has been reflected in the exploitation of the palm trees for building purposes.

The objectives of this research are to provide botanical description of the South Sulawesi native lontar palm, to describe the status and potential of lontar palm trees in Jeneponto district in South Sulawesi province, and to determine the influence attitudes by the community behavior on the lontar palm trees conservation.

Research Methods

Time and Location

A traditional quantitative strategy was adopted for the study, which was conducted over a four month period, between January and April, 2015. The targeted area was in the four sub-districts of Bangkala, Tamalatea, Binamu and Arungkeke within the district of Jeneponto (5°40'S 119° 38'E), South Sulawesi, Indonesia.

Research Analysis

The research was based on a field observation, literature review, descriptive and inferential analysis. The data used in the study was a combination of primary and secondary data. Primary data collection was based on field observations and interviews, using Amzu (2007), Azwar (1995), Fishbein and Ajzen (1975), and Kerlinger (1974) as references for the methodology. The literature reviewed and secondary data collected came from relevant agencies, including the local Bureau of Statistics Planning, government offices *(Bappeda)*, plantation and forestry offices, departments of industry and trade, sub-district offices and village offices relevant to the research sites in the district of Jeneponto.

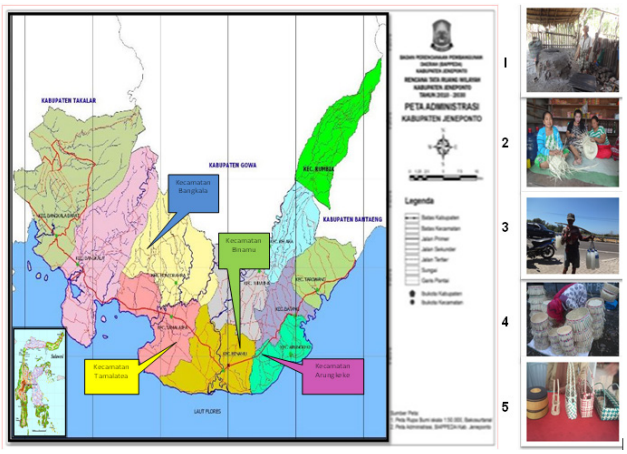

Figure 1. Location of research sites in the four sub-districts of Bangkala, Tamalatea, Binamu and Arungkeke in the Jeneponto district, South Sulawesi, Indonesia.

Results and Discussion

Ecology of the Lontar Palm

In Indonesia, the palmyra palm is also known as the lontar palm or siwalan tree. The palmyra plant (*Borassus flabellifer* Linn; Figure 2 A) belongs to the *Arecaceae* family. Other names of palmyra plants are listed on Table 1.

Figure 2. The native lontar palm tree (*Borassus flabellifer* Linn*)* in Jeneponto South Sulawesi, Indonesia

The lontar palm grows in well drainaged soils at altitudes 0 to 500 m above sea level. The annual rainfall in Jeneponto province where the tree grows ranges from 420 mm to 1115 mm. The type of climate is Type F or Type AW (Schmidt and Ferguson).

The lontar tree is the floral identity of South Sulawesi province. The tree has a variety or uses. The leaves, stems, fruit and flowers can be tapped for drinking straight as 'legen' (sap), fermented into wine, or processed into sugar palm. The fresh sap is a good source of vitamin B complex (Morton, 1988).

Botanical Description of the Lontar Palm Tree

Roots and stems

Based on our observation in the four sub-districts of Jeneponto, i.e. Bangkala, Tamalatea, Binamu and Arungkeke, the native lontar palm tree has long hairy roots and large, tall and upright, single-trunked and cylindrical trunk which reaches a height of between 25 to 30 meters. The trunk diameter at breast height is usually between 40 and 50 cm. The base to the trunk is normally full of side roots, young stems and is encased in dry black leaf stalks. Young trees have an empelur ejection rod that is soft and is edible. Finer old trunks have stems with a grooved surface, the grooves representing the point of former attachment of the petiole. At the end of the rod are called 'umbut' or palm hearts, which are sweet and edible. The wood of coconut palm is similar to regular wood, but the wood secretion is darker. Wood from female trees is usually stronger than that from male trees. When the palm trees become old, the male trees are used as source of timber. Davis and Johnson (1987) found a three-pronged palm trunk, but reported that this happens in response to irregularities or abnormalities in the growth process.

Table 1. Names of the lontar palm in the different regions of Indonesia and throughout the world

No	Region	Name	Term	Country	References
1.	Bugis	Ta	Lontara	A	1,3
2.	Makassar	Tala’	Lontara	A	1,2,3
3.	Madura	Taal, Tarebung		A	2
4.	Bengali	Tal		B	2,3
5.	Lombok	Tal		A	3
6.	Sailan	Tal Gaba		B	3
7.	Jawa Island	Tal, Ental, Siwalan		A	1,2,3
8.	East Nusa Tenggara (Nusa Tenggara Timur)	Etal, Ental		A	1,2
9.	Sumbawa	Juntal, Mangilu, Ta’a		A	1,3
10.	Sasak	Duntal		A	2,1,3
11.	Bali	Rontal		A	2,
12.	Flores	Puukon, pohon kori/koli		A	1,2
13.	Solor	Tuak poking		A	4
14.	Sampit East Kalimantan	Lontar		A	1,3
15.	Ambon	Lontaro		A	3
16.	Seram Ambon	Kolir watan		A	2
17.	Kei NTT	Koil		A	1
18.	Rote NTT	Tua		A	3
19.	Savu NTT	Duwe		A	3
20.	Kambang	Pohon Daun Tala		A	3
21.	Dayak	Pohon Tuak		A	3
22.	Melayu	Pohon Siwalan		A	2
23.	Sumba	Mangito, Manggito		A	1,2
24.	Kangean	Bhughana, Kara-kara		A	2
25.	India	Tal, Brab Tree, Palmyra-Palm		B	1,3,4
26.	Tamil on General	Panay-maram		B	3
27.	Telegu	Tete chuttu		B	3
28.	Cambodia	Dom Thuot		B	3
29.	Vietnamese	Cay thot lot		B	3
30.	England	Palmyra-palm		B	1,3,4
31.	Portugal	Palmeyra		B	3
32.	Thailand	Tanta note		B	3
33.	Netherlands	Jagerboom		B	1,4
34.	Africa	African borassus		B	3

Notes: A= Indonesia; B= Other Country. References = 1 (Salahuddin, (1992); 2 (Sastromidjoyo (1997); 3 = Fox (1977); and 4= Effendi (1982) in Hammado (2008).

(A) **(B)**

Figure 3. Mature trees (A) and root system of a young South Sulawesi lontar palm (B).

Leaves of lontar palm

The leaves of the lontar palm tree (Figure 4) have a very important role for the overall growth and development of other organs, stem, empelur, flowers and fruit. The lontar palm has odd pinnate leaves appear at the rod tip and whorls that comprise 25 to 40 pieces in the shape of a fan. Each leaf stalk grows up within a month. Green leaf blades, rather gray, have a width of 1 to 1.5 m and form into 60 to 80 segments. Each leaflet bone is supported by leaves 40 to 80 cm in length under strands of leaflets, and have a forked branch.The long petiole is usually woody brown or black, and is thorny along its back.

Figure 4. The leaves of a young South Sulawesi lontar palm

Flowers and fruit of lontar palm trees

Lontar first flowers at the age of about 12 years and can then bloom for up to 20 years, with a potential life span of up to 100 years. There are male and female palm trees. Male tree flowers grow from the armpit leaves, and are generally very rare single and twin-stemmed. The male flowers have some ears or 'mayang', which are globular clusters. The grain length is usually between 30 to 60 cm, and the diameter between 2 and 5 cm. A cluster is composed of 4 to 15 mayang. The female flowers comprise between 4 to 10 mayang in a cluster (Figure 5A), with the flowers usually being small and are covered by a bract (bractea) which will bear the fruit.

Study by Hammado (2008) reported that each ovary has three boxes of ovules, depending on the process of fertilization/pollination. The number of seeds in one palm fruit can range from one to three. Each palm tree produces 6 to 12 bunches of fruit at a time, or between 200 to 300 pieces of fruit each year. Palm fruit are round in shape with a diameter of 10 to 15 cm. The young fruit are green and becoming dark purple to black on maturing (Figure 5B). The flesh (endosperm) of the fruit is edible; it is sweet, has a gelatinous texture and is watery, and hardens after darkening. One palm fruit contains three seeds and the shell is thick and hard.

(A) (B)

Figure 5. Fruits (A) and flowers (B) of South Sulawesi lontar palm

The Current Uses of Lontar Palm in Jeneponto District

The main uses of lontar tree in Jeneponto are to produce brown sugar and handicrafts. The majority of the community (73%) used lontar leaves to make baskets, hats and other handicrafts for souvenirs. The juice can be consumed directly as a fresh drink, or be left to become fermented by microbes. In some research sites lontar saps are harvested directly from the trees for drinking, or processed into red sugar. Tapping is done every day from morning to evening.

Making red sugar has been a traditional business in Jeneponto for generation and is a source of income of majority of the people (83%) in this area. However, there are 17% of respondents who stated that the process of making red sugar are time consuming and tedious. The fruit naturally contains alcohol and the local people process it into traditional gin or wine for consumption.

The community in Jeneponto has not processed lontar seeds into food products. Lontar seeds are good source of carbohydrate, fiber, and amino acids (Arunachalam et al., 2011), but are low in fat and protein (Mason and Henry, 1994). The detail uses of lontar palm by Jeneponto community are described in Sukamaluddin (2014).

The Conservation Status of Lontar Tree in Jeneponto

The spread of palm plants in South Sulawesi has grown and it is now often found in the districts of Jeneponto Takalar, Gowa and Bone. The lontar palms are usually found in sporadic clusters, and of the four districts the majority are in Jeneponto. The density and age of the trees in the Jeneponto region is 50 trees per ha aged between 1-5 years; 37 trees per ha aged between 5-10 years; and 32 trees per ha aged more than 10 years. About 27% of trees are new and are being managed by the local communities. The general statistics of the lontar palm in the different sub-districts in Jeneponto province are summarised in Table 2.

In relation to the current attitudes relating to palm tree preservation and conservation, 76% (23) of 30 surveyed respondents indicated that they agree that replanting of the palm trees is necessary to restore the tree population in Jeneponto district. Respondents stated that lontar plants are resistant to drought and are low maintenance, they do not require fertilization, pest and disease control. If the plants are properly maintained, it would also produce good results, juice, fruit and leaves. Some 73% of the survey respondents supported the utilization of palm tree leaves for the production of souvenirs.

Jeneponto community has been aware of the importance of tree replanting. Jeneponto government has initiated tree replanting program "*Gammara*" or "Jeneponto Society Movement towards Clean and Green Environment". The research also revealed the majority of the people (76%) stated that they would be willing to participation in initiatives, such as replanting, to preserve the palm tree population. However, it is stated that they need assistance to access good source of quality planting materials, and to do a better management of lontar plantation.

People's behavior in the preservation of palmyra plants can be realized by encouraging communities to preserve the lontar palm plants by participation in the planting palm trees. This is also believed to have potential benefits for the welfare of communities in Jeneponto.

Table 2. The Population of Lontar Plant Based on Age in Jeneponto District, South Sulawesi, Indonesia*

Sub District	Sub district area (km2)	Lontar palm area (ha)	The age class of trees		
			Young[1)]	Adult[2)]	Tapped[3)]
Rumbia	5,830	3235,2	16,176	5,500	4,206
Kelara	4,395	7,462,4	14,747	10,901	9,463
Tarowang	4,068	2,892.39	14,462	10,572	9,251
Turatea	5,376	2479,1	12,400	7,719	5,719
Batang	3,232	851.89	4,260	5,934	4,704
Binamu	6,949	2,949.35	20,590	15,860	1,227
Tamalatea	5,758	3,172	37,312	27462	29,032
Bontoramba Bangkala	8,832	4,118	15,860	16,472	12,354
Barat	15,296	5,754,01	28,771	17,262	11,508
Bangkala	12,182	5,395,83	26,980	26,980	21,624
Arungkeke	2,991	1,134.15	5671	4,534	3,361
Total	74,909	39,444.32	197,229	149,186	128,449

*From Forest Department of Jeneponto Region, 2015
Note: [1)] 1-5 years old; [2)] 5-10 years old; [3)] >10 years old trees

Conclusion

Overall the study identified that density of lontar trees in the age range of 1-5 years is 50 trees per ha; for trees aged 5-10 years it is 37 trees per ha; and more than 10 years is 32 trees per ha. Approximately 27% of the area under lontar palm trees is now managed by local communities for commercial purposes. The sub-district of Tamalatea has the largest potential for lontar palm trees in the Jeneponto Region. In relation to the the preservation of the lontar palm trees through participation in conservation planting, 76% of the survey respondents indicated that they would be willing to participation in initiatives to preserve the palm tree population. Public attitudes strongly support the use of palm leaves for home crafts to produce souvenirs for both local and foreign tourists who visit Jeneponto district.

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